FAA AVIATION NEWS

MAY 1967

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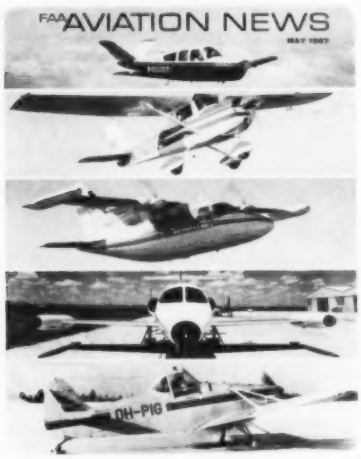

COVER

FAA planners look into Aviation's crystal ball and predict a great leap forward in the next decade. See page 8.

FAA AVIATION NEWS

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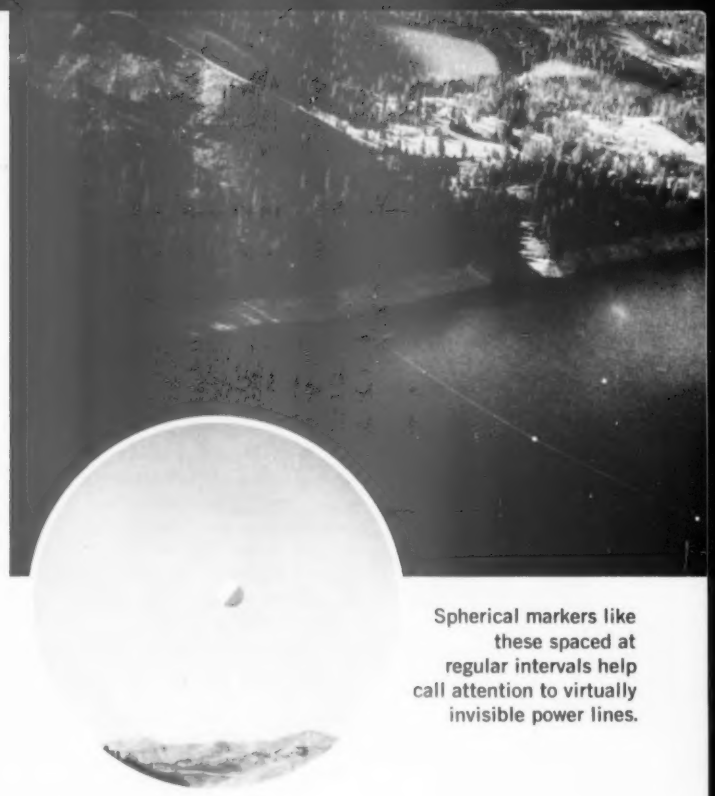
TO SEE OR NOT TO SEE



Spherical markers like these spaced at regular intervals help call attention to virtually invisible power lines.

Two solid objects cannot occupy the same space at the same time. No pilot, surely, would deliberately test the obvious truth of this scientific law. Yet some 15 planes a month tangle with overhead transmission lines and their supporting structures. Frequently such accidents are fatal.

The basic problem is visibility. Wires can be very difficult to see in a fast moving aircraft. Many wires are not marked at all and others are so inadequately marked that by the time the pilot spots the markings, it is too late for him to take evasive action.

While the FAA does not have legal authority to *require* that overhead lines be marked, it has set out recommended standards in the *FAA Obstruction Marking and Lighting Handbook* (1962) specifying that spherical markers of not less than 20 inches be displayed on overhead lines that FAA determines to be obstructions to air navigation. With general aviation aircraft becoming faster each year, the FAA is now considering recommending a larger marker. However, of 453 recent accidents involving overhead transmission lines and supporting structures, *none* involved wires marked in accordance with FAA standards. Of the 453 accidents (recorded in a 30-month period ending December 1965), 169 involved crop dusters and about 50 involved pilots who sought to operate in places that were not designated landing areas.

With normal general aviation speeds now reaching from 180 to 240 miles per hour, compared with 70 to 100 some 20 years ago, the FAA is reviewing the problem and is now considering amending its standard to recommend that spherical markers be at least 54 inches in diameter if they are located more than 15,000 feet from an airport. The larger markers are particularly valuable for long spans of transmission lines above valleys and over bodies of water since they can be seen from greater distances. A wire stretched several thousand feet across a canyon, for example, is constantly moving because of wind and changes in temperature.

The conflict between powerline and aircraft has grown over the years. From a legal point of view, it has been said that a landowner's right to use his land for reasonable purposes is dominant over the right of aerial navigation through the airspace above it. Indeed, pilots who hit power lines have frequently been held legally responsible for the damage they have caused power companies.

But with more and more lines spiderwebbing even remote parts of the nation, and with a continued increase in low-flying aircraft, the legal responsibility is but a small part of the problem. The main concern is how to prevent this type of accident.

One way that FAA lends a helping hand is to bring hazards to the attention of the companies involved. Frequently the hazards are then removed. In February, for example, the California-Pacific Utilities Co. agreed to remove poles and wires from the approaches to the Fredonia (Calif.) Airport after FAA called attention to the danger to aviation. In Arizona, the Mountain States Telephone and Telegraph Co. elected to bury, rather than elevate, cables east of the Buckeye Municipal Airport.

While this solution may seem impractical for lines spanning wide rivers and canyons, in some areas lines may be going underground. In Maryland, for example, a bill was introduced this year in the State General Assembly to prohibit construction of above-ground power lines and require that present lines be put under ground by 1972. The bill if passed would contribute greatly to safe flight in Maryland.

While utility companies have opposed putting lines under ground for economic reasons, some advocates of buried cables say that in the long run this may be the least expensive way. They point out that power lines damaged by hurricanes, wind storms and ice must be replaced at high cost.

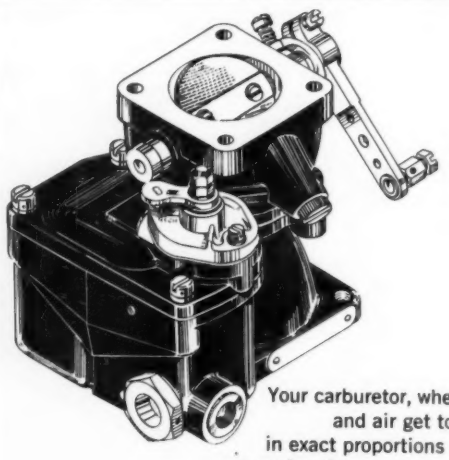
But the more immediate solution would seem to be a broad program to have power lines adequately marked and to have pilots made more aware of the dangers involved. Logically enough, records show that the number of wire/pole collisions increase from May through September when more general aviation pilots take to the air. And despite difficulty in seeing lines at dusk or during rain storms, there are more such accidents during daylight hours, when flight activity is greatest. Flying against the sun, or a hazy background, calls for greater attentiveness on the part of the pilot.

Wires are a serious occupational hazard for crop dusters. For others, most accidents occur during landings, takeoffs, approaches and climbouts—in a word, close to the airfield. Wires have been struck at heights varying from 20 feet to 400 feet above the ground. Pilots should keep in mind that wires generally follow roads and are located near buildings. While examining the area for poles or other supporting structures for power lines, it is important to realize that they are frequently hidden by trees. When approaching a strange airport, a pilot should circle at a safe altitude above the pattern to study the layout before entering the pattern.

Overhead wires and the poles that hold them up may or may not be here to stay. But there is good reason to eagle-eye every area that looks suspiciously bare from the air.

The Key To Sweet Engine Sounds...

The Little Red Knob



Your carburetor, where fuel and air get together in exact proportions to give your engine the power you select.

That bright red half-dollar-sized knob jutting out from the instrument panel, or nesting with the throttle and propeller controls in the engine control quadrant, is the key to more efficient engine operation, fuel economy and flight safety. It is the *mixture control,* and it regulates the fuel/air mixture going into the engine. The ratio of this mix is the most important single factor affecting the power output of an engine.

Parsimonious pilots who "lean" their engines more than the manufacturer recommends, run the risk of rough engine operation, sudden "cutting out", backfiring, detonation, overheating and loss of power.

Profligate pilots who feed their engines to rich a diet (excessive fuel, in terms of weight, for the amount of air) can expect rough engine operation too.

The trick is to find the right mixture for specific flight conditions — cruise, altitude changes in flight and any other situation requiring power changes. Takeoffs and landings are always made with the mixture control set at "full rich" except under special circumstances, such as operation from a high-altitude airport or in unusually high temperatures.

Gasoline engines require approximately 15 pounds of air in order to completely burn one pound of fuel. But this is an ideal mixture and is not necessarily the best for all flight conditions. The most useful mixture can run from a weight ratio of 1 (fuel) to 11 (air) up to 1 to 16. Fuel/air ratios may be given directly, such as 1 to 12, but in more common useage, they are designated as decimals such as 0.083, indicating the fuel weight per pound of air.

To understand mixture control, or fuel/air ratio, begin with the carburetor. This is where the fuel is atomized or vaporized, by mixing it with a specific quantity of air. The correct mixture of fuel and air will be obtained at sea-level with the mixture control in "full rich" position.

This last consideration presents a peculiar difficulty in the case of aircraft engines since they do not remain at sea level in normal operations. The air at higher altitudes is not as dense and therefore does not weigh as much per cubic foot as sea-level air. As an airplane climbs, at constant rpm, the *volume* of air entering the carburetor remains the same but the *weight* decreases, thereby changing the fuel/air weight ratio.

In other words, as the aircraft climbs, the weight of a given volume of fuel remains more or less constant, while the weight of a given volume of air diminishes.

Since the amount (weight) of fuel entering the carburetor depends on the volume of air and not on the *weight* of air, the mixture becomes richer as altitude increases.

The way around this problem is to adjust the amount of fuel that passes through the main jet of the carburetor. This metering is done by the mixture control, which is connected to the carburetor by mechanical linkage. The volume of air remains the same, but the quanity of fuel is reduced. This restores the desired fuel/air weight ratio.

To determine the best fuel/air ratio for various flight conditions in your aircraft, heed the manufacturer's recommendations closely.

Most manufacturers do not recommend leaning the mixtures below 5,000 feet because below that altitude there is no particular gain in efficiency. Moreover, there is a good possibility of damaging the engine at a high power setting. This is where pilot alertness plays an important part. After cruising for a time with the mixture leaned out, a pilot may forget to change mixture when descending to land at a low elevation airport. The increased density of the air distorts

the fuel/air ratio to a point where the mixture is so lean the engine runs rough and gives every sign of "cutting out."

The remedy is readily at hand—simply enrich the mixture and the engine resumes its sweet song. Heads-up flying, of course, would prescribe gradual enriching as the descent is made, thus providing the most efficient power with fuel economy. To push the control into "full rich" at high cruise altitude presents the risk of rough engine operation, but this condition will gradually lessen as denser air is encountered during the descent.

Over-leaning the fuel/air ratio is a major factor contributing to fuel *detonation* in the cylinders. Others are incorrect octane rating of the fuel, and excessive cylinder head temperature and manifold pressure. Detonation is a destructive spontaneous explosion of the unburned gasses in cylinders *after* normal ignition. It happens when the temperature and pressure of the unburned fuel reach critical values. The result is a sudden and violent explosion rather than the relatively slow burning of normal combustion.

Continued operation when detonation is present can result in "dished" piston heads, collapsed valve heads, broken rings, or eroded portions of valves, pistons, or cylinder heads, and may terminate in sudden and complete engine failure.

Just as destructive as detonation is *pre-ignition*, which may trigger detonation, just as detonation may precipitate pre-ignition. Again, lean mixtures are involved, along with other factors such as high intake air temperatures, high manifold pressures and improper cooling.

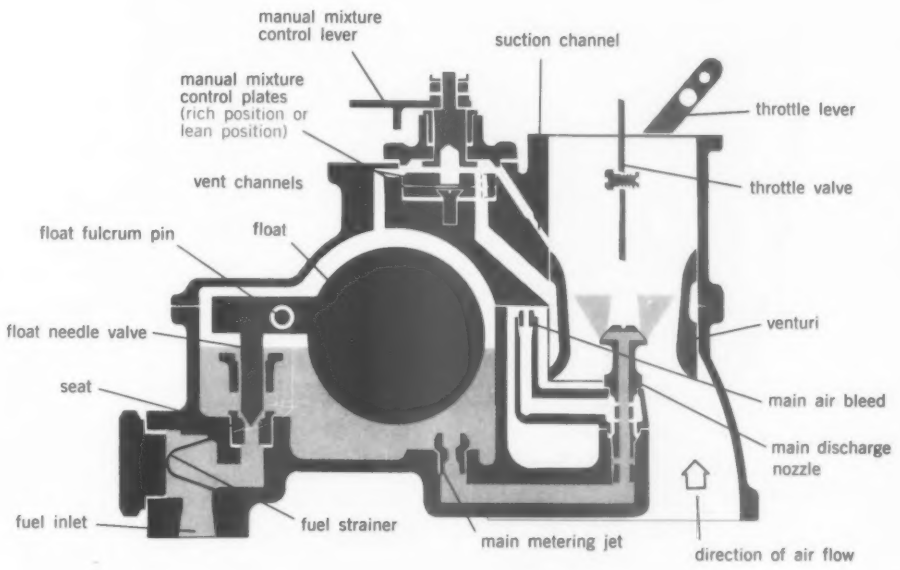
Pre-ignition is the uncontrolled firing of the fuel/air charge *before* normal ignition. It is commonly caused by an incandescent area in the combustion chamber which fires the fuel prematurely. A glowing spark plug, incandescent exhaust valve or particle of carbon or lead can cause pre-ignition.

Pre-ignition presents a special hazard on the ground after an engine has been run at high rpm for a prolonged time, especially during ground runup for test. Even though the switches and fuel are turned off, handling the propeller before the engine cools is extremely dangerous. Sufficient unburned fuel may remain in the cylinders to cause the engine to kick over a few revolutions if the propeller is moved. This has accounted for fatalities and serious injuries.

If the evils of too-lean a mixture can be amply demonstrated, is there an automatic measure of safety in using a too-rich mixture at high altitudes?

Unless the engine is supercharged, operation at high altitude with an excesively rich mixture will result in reduced power, and fuel waste. Too rich a mixture will also encourage fouling of the spark plugs by causing a below-normal temperature of the spark plug center electrode. Carbon and lead deposits accumulate on the electrode, and since the deposits are electrically conductive, the electric current may flow through rather than jump the gap. No ignition can occur and engine shut down may folllow.

Proper use of mixture control can add to the life of your engine, reduce fuel and repair bills and increase your safety and flying pleasure. Learn to use that little red knob on the control panel.



Schematic Diagram of Stromberg NA-S3A1 Float Carburetor

Illustrations, courtesy of Bendix Products Aerospace Division

Outstanding Aviation Mechanic Safety Award Winners Announced

Forrest L. Stolzer
SOUTHWEST

The outstanding safety-conscious general aviation mechanic of 1966 is Forrest L. Stolzer of Little Rock, Ark. Mechanic Stolzer was named by the Flight Safety Foundation for top honors, which include a $500 cash prize and an all-expense trip to Washington, D. C. The winner was chosen from a field of seven finalists in the general aviation division of the Fourth Annual Aviation Mechanic Safety Awards program.

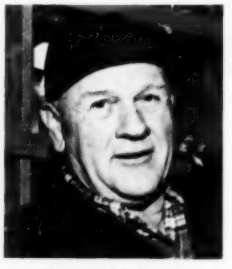
The competition is jointly sponsored by American Aviation Publications, Air Transport Association, Flight Safety Foundation and the FAA, with cooperation from other elements of the aviation community.

The seven finalists, and the regions they represented, were:

Forrest L. Stolzer, Little Rock, Ark. (Southwest); Jack W. Pell, Bridgeport, West Virginia (Eastern); George M. Brown, College Place, Wash. (Western); Claude Evans, Roseville, Mich. (Central); Ronald J. Clare, Juneau, Alaskan (Alaska); Milford R. Miner and Donald Merkison, both of St. Simons Island, Ga. (Southern).

Milford R. Miner
SOUTHERN

Donald Merkison
SOUTHERN



George M. Brown
WESTERN

Jack W. Pell
EASTERN

Ron J. Clare
ALASKAN

Claude Evans
CENTRAL

Stolzer, 59, designed, built and tested a device to insure foolproof use of reverse thrust controls on twin-engine turboprop aircraft. Stolzer's device locks the reverse thrust feature out of use unless the propeller controls are in full forward high rpm position. This insures uniform thrust from both engines and better direction control of the aircraft during deceleration. He is employed by Central Flying Service, of Little Rock.

Pell, 39, is with Helicopter Patrol, Bridgeport, W. Va. He has been an aviation mechanic since his graduation from the Pittsburgh Institute of Aeronautics in 1949. He made the finalist list with a helicopter modification. He designed a solid shim of 4140 steel to present development of bad tan gear pattern and loss of torque, thereby extending the life and dependability of Bell helicopter fan drive gear unit.

(The Bell Helicopter Co. now manufactures a solid shim for production and spare part sale.)

An automatic, pilot controlled, flagging system he developed for guiding agriculture dusting aircraft put George Brown's name on the top seven list. Brown, employed by Blue Mountain Aviation of Walla Walla, Wash., put 15 years into the development of the device and has a patent pending; it has FAA approval under a supplemental type certificate.

Brown's automatic "flagman" is expected to reduce injury and fatalities among ground flagmen and increase safety to pilots and planes. Interest in the device has been expressed by foreign operators of crop dusting aircraft.

A bent for thoroughness led Claude Evans to an inspection procedure that is now standard with his firm, Michigan-Wisconsin Pipeline, Detroit, and may be adopted by others. His thoroughness also put him in the finalist circle.

He developed a method for detecting the sideplay in the main gear shock struts, which could not be found following normal inspection procedures—with the plane on wing jacks and the struts extended. Evans' method involves use of axle jacks with the struts collapsed.

Ronald Clare's contribution to aviation safety was his development of a method of determining the amount of mercury required in the mercury clutch of the Hiller UH-12E to insure positive clutch engagement during starting. This prevents excessive wear of the clutch blocks during this critical period. Clare is with Livingston Copters, Inc., of Juneau, Alaska.

Education of pilots on the importance of preventive maintenance as a positive step toward aviation safety put Milford Miner and Donald Merkison in the finals. They conducted an effective campaign showing aircraft owners various maintenance deficiencies discovered during routine oil change. They are both employed by Golden Isles Aviation, of St. Simons, Ga.

Walter H. Beech
. . . aircraft maker

GIANTS OF THE INDUSTRY / first of a series.

Early film star Wallace Beery chatting with Walter H. Beech in front of Travel Air Model 6000, in 1929. Original **Bonanza,** top, flown in 1945, is still being produced. Model 17R, right, introduced classic stagger-wing. It was the first plane to bear the Beech name.

Thirty years ago a small, highly interested group of aircraft engineers, mechanics, office hands and just plain curious hangers-on stood shivering on a Kansas plain just outside Wichita. The date was Jan. 15, 1937, and Walter H. Beech was about to send his Model 18 on its maiden flight.

This was to be a milestone in general aviation. Model 18 was a revolutionary plane—an all-metal craft powered by two 350 h.p. engines that sent it scudding along at 200 miles per hour on a nonstop flight of more than 1,000 miles with a full load.

So good was the basic design that Beech Aircraft Corporation is still making the Model 18, though it is a much improved version of the original. To date, more than 9,000 Beech-designed Model 18s, in all their various aliases—AT-7, AT-11, C-45, JBR, SNB—have been sold throughout the world. Their inventor became one of the giants of the industry.

Born in 1891, Walter Beech had his first infection of airplane fever at 14 when he cobbled together his own original version of a glider on the family farm in Pulaski, Tenn. How it performed is not recorded, but his next encounter with flying machines took place on July 11, 1914, when he soloed a Curtiss pusher. This was the start of his 36-year career as one of the most influential shapers of general aviation.

World War I came and Beech served as a pilot, instructor and engineer in the Army Air Corps. When the shooting stopped he joined hundreds of other ex-military flyers, spreading the gospel of flight by barnstorming through every state in the union. His engineering sense and inquisitive mind began to gather aeronautical lore that he translated into plans for the future.

By 1923 the lure of the open road and the life of an aeronautical vagabond began to lose their appeal. He came to Wichita where he joined Swallow Aeroplane Company as test and demonstration pilot and salesman. He quickly moved up to become general manager of the company.

A year later he promoted himself right out of the company—he resigned and formed the Travel Air Manufacturing Co. and within four years became the world's largest producer of monoplanes and biplanes. The Beech-designed *OX-5 Travel Air,* a three-place biplane that became synonymous with airplane, appeared in 1924. In 1929 his *Mystery S,* a low-wing monoplane, won the 50-mile Thompson Trophy closed course free-for-all race with a speed of 194.9 m.p.h.—the first time a civilian airplane had ever beaten military aircraft in speed competition.

Travel Air became part of Curtiss-Wright in 1929 and Walter Beech became president of Curtiss-Wright Airplane Co. and vice president in charge of sales of Curtiss-Wright Corporation. The titles were fine and the pay was good, but Beech yearned for his own company and a more active personal role in aircraft design and construction.

So he and his wife, Olive Ann, formed Beech Aircraft in 1932, setting up shop in rented quarters in a depression-closed factory in Wichita. Their first product, the classic Model 17R stagger-wing biplane, took to the air on Nov. 4, 1932. It lived up to its design specifications that called for a five-place luxury plane with a top speed of 200 miles per hour or better, a landing speed of no more than 60 miles per hour, a nonstop range close to 1,000 miles, easy controllability and sound aerodynamic characteristics. By the time production ended in 1948, 781 stagger-wings airplanes had been produced; a considerable number are still flying.

After playing a major role in aircraft production in World War II, Beech turned his design genius to meet the expected post-war boom in general aviation. In 1945, he introduced the famed V-tailed *Bonanza.* More than 8,000 of these have been produced and the demand continues.

The company that Walter Beech and his wife launched in the depression, 35 years ago, is doing very well at the bank and on the production line. The 25,000th Beechcraft, a King Air, was wheeled out of the hangar in September 1966, and sales for fiscal year 1966 were in the area of $165 million.

That 14-year-old Tennessee farm boy started something, back in 1905, when he tinkered with his first aircraft.

—Frank J. Clifford.

Olive Ann Beech has headed Beechcraft since the death of her husband in 1950. In 30 years the company has grown to 10,000 employees and produced its 25,000 Beechcraft, a **King Air,** turboprop in September.

The Decade Ahea

FAA planners peering into the crystal ball of things to come in the sky predict that the next ten years will see the most dramatic transformation in the history of aviation in the United States. They prophesy a near doubling of the civil aircraft fleet and a tripling of aircraft operations.

"Aviation Forecasts, Fiscal Years 1967-1977," developed by the Federal Aviation Administration to plan its aviation facilities and services during the next decade, foresees 183,500 active civil aircraft in 1977—a staggering increase over the present fleet of about 105,500.

Also in the picture for 1977 are 139 million annual aircraft operations—take-offs or landings—at airports with FAA air traffic control towers. In 1966 FAA terminal controllers handled a mere 41.2 million operations, with 304 active towers. Computerization and other new hardware will step up the capability of existing towers, but nevertheless many more controllers and facilities will be needed.

General aviation will continue to dominate the skies numerically. In recent years there has been a strong uptrend in all phases of general aviation activity and the outlook for continued growth throughout the forecast period is extremely favorable. At the beginning of 1967 there were 104,000 active aircraft in the general aviation fleet. This number is expected to increase to 152,000 by 1973 and to 180,000 aircraft by 1977. Each class of aircraft will increase in number but growth rates will differ significantly by aircraft type.

Single-engine aircraft, which will continue to make up the great bulk of the fleet, will rise from 88,000 at the begining of 1967 to an estimated 124,350 by 1973 and to 143,600 by 1977. Most of these gains will be in the larger four-seat models, but increases will also be shown in the two-place types. Multiengine piston aircraft are expected to nearly double during the forecast period, numbering approximately 23,000 by 1977. Rotorcraft will also show significant gains, rising to about 4,000 by 1977. But this number will still represent only about 2 per cent of the total general aviation fleet.

Upsurge in Jets

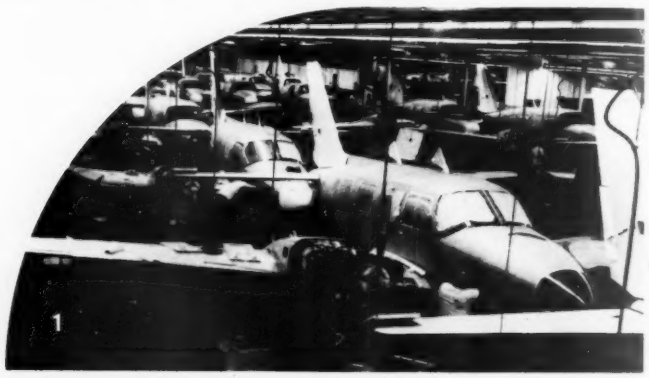
Of special interest is the sharp rise anticipated in turbine-powered general aviation aircraft. At the beginning of 1967 there were only 950 in the active fleet and estimates place their current number at approximately 1,000. The forecast calls for 4,750 by 1973 and approximately 8,000 by 1977. Most of these will be powered by turboprop engines, but a considerable number of pure jets are also expected. Conversion of existing piston aircraft to turbine power should account for part of the anticipated growth. Business flying and air taxi operations represent the primary markets for turbine-powered aircraft.

Total hours flown in general aviation are expected to increase from an estimated 19 million hours in fiscal year 1967 to 29 million hours in fiscal year 1973 and to 35 million by fiscal year 1977. Business flying will remain the largest type of general aviation flying and is forecast to account for 10.4 million hours in fiscal year 1977, or approximately 30 percent of the total, as against 6.5 million hours in fiscal year 1967.

Both scheduled and non-scheduled air taxi operations will continue to show marked gains and are expected to become an increasingly important part of the Nation's air transportation system in the years ahead. Air taxis will fill a void in air service to small communities which do not generate sufficient traffic to warrant scheduled air carrier service with large transport type aircraft. At the same time there will be an increasing demand for air taxi connecting services in major metropolitan areas between air carrier airports and outlying communities.

Personal and instructional flying are expected to show higher than average growth rates, stimulated by learn-to-fly programs, rising per capita incomes and an increasing desire for travel.

The greatest accumulation of aircraft will be in the West, which will assume leadership in general aviation flying long held by the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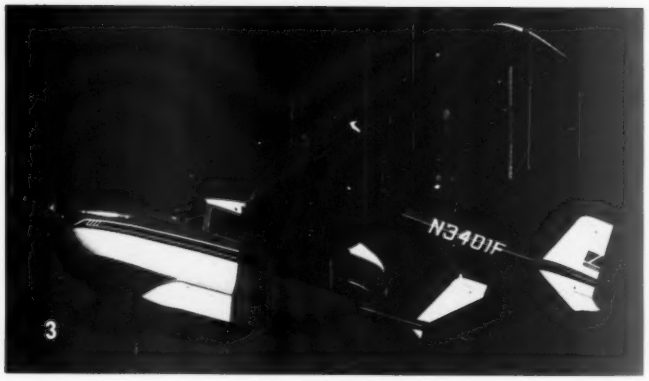

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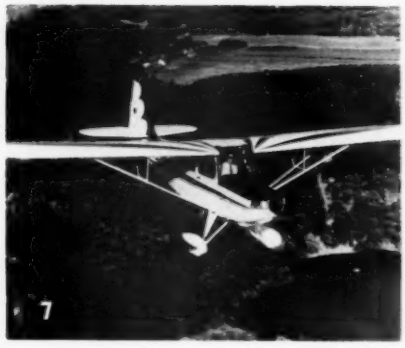
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Ahead

Giant Strides Forecast for General Aviation

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central states. Some 48,200 aircraft will be based in the western states in 1977.

Aircraft Population Explosion

Annual production of general aviation aircraft will jump from 17,000 in fiscal 1967 to 29,000 in fiscal 1977. Air carrier production will decline, from 445 units estimated in fiscal 1967 to 250 units 10 years hence.

However, on the air carrier side, the long range look sees United States domestic and international carriers handling an estimated *352 million passengers* and flying *266 billion* revenue passenger miles in 1977, nearly *triple* the figure for fiscal 1967.

This population explosion in the air will be borne aloft by an air carrier fleet numbering about 3,500 aircraft by 1977. By far the greatest number (2,953) will be jets, with passenger capabilities ranging up to 500 persons. Supersonic transports should number about 86.

The entire aviation industry will feel the effects of rapid expansion. Demands on aviation fuel, for example, are expected to nearly triple in the next decade, rising from 5.6 billion gallons annually in fiscal 1967 to 14 billion gallons in fiscal 1977.

Jet fuel consumption will account for all of the increase. Aviation gasoline demand is expected to decline to a paltry 0.6 billion gallons in 1977.

The carriers will gulp the lion's share of fuel, burning 13 billion gallons in 1977, almost all of it in jets. General aviation will burn about 1 billion gallons, somewhat less than half in jets.

A proportional increase may be expected in other aircraft supplies and services, with many new careers in aviation developing. The decade ahead may offer opportunities for broad popular acceptance of air travel on a scale matched only by the popularization of the automobile in the decade of the Twenties.

A limited number of free copies of FAA's "Aviation Forecasts, Fiscal Years 1967-1977," are available to the public. Written requests should be addressed to FAA, HQ-438, 800 Independence Ave., S.W., Washington, D.C. 20553, accompanied by a self-addressed mailing label.

ACTIVE GENERAL AVIATION AIRCRAFT BY TYPE OF AIRCRAFT

As of January 1	Total	Piston		Turbine	Rotorcraft	Other
		Single-engine	Multi-engine			
1962	80,632	71,010	8,211	186	798	427
1963	84,121	73,456	8,978	213	967	507
1964	85,088	73,626	9,458	245	1,171	588
1965	88,742	76,136	10,346	306	1,306	648
1966	95,442	81,134	11,422	574	1,503	809
1967*	104,000	88,000	12,500	950	1,700	850
1968*	112,000	94,000	13,600	1,550	1,900	950
1969*	120,000	100,000	14,650	2,260	2,070	1,020
1970*	128,000	106,100	15,700	2,900	2,250	1,050
1971*	136,000	112,200	16,750	3,500	2,450	1,100
1972*	144,000	118,300	17,800	4,100	2,650	1,150
1973*	152,000	124,350	18,850	4,750	2,850	1,200
1977*	180,000	143,600	23,000	8,000	4,000	1,400

*Forecast.

1. Multi-engine piston aircraft will number 23,000 within 10 years
2. Twins come in various sizes and powerplants to suit every need.
3. Detachable cargo pods adds extra capacity.
4 Business can be pleasure when goings and comings are by air.
5. Family picnics at far away places will include the family plane.
6. Floats can add a new dimension to the versatile private plane.
7. The nimble, fully aerobatic two-seater.
8. Modern twins hit speeds of early WW II first line fighter planes.
9. General aviation rotorcraft fleet will hover at 4,000 in 1977.

the one maneuver you never stop learning . . .

LANDING

Landing an aircraft must be very simple indeed—Orville Wright did it perfectly the very first time he tried.

But Orville's prowess notwithstanding, landing remains the most hazardous phase of flying. About one-half of all general aviation accidents (not including power failures) are landing mishaps. It's not as easy as it looks.

Moreover, landings cannot be avoided —like weather or other hazards. Whatever goes up must come down. Landing procedures have to be learned early and practiced late. No two landings are ever exactly alike—every go-around presents a unique set of wind, traffic, terrain and other changeable conditions. Veteran pilots agree that there is simply no such thing as a routine landing. They are all crucial.

Since landing accidents rate high on the tally sheets—about 2,500 a year—the message is obvious: the time to stop practicing landings is never.

Establishing the Pattern

Whether the pilot intends to go down on a dirt strip, or onto a runway at O'Hare Airport, his entry into the pattern establishes the basic design of his landing. He must fit himself into the flow of traffic, if any, at a proper altitude, and he must establish a course to be flown to his intended runway.

Generally speaking, pattern altitude for small aircraft is between 600 and 800 feet above the surface. Descent to the proper altitude should be made *before* entering the pattern, relying on the altimeter; heights are difficult to guess, even for seasoned pilots. Forming the habit of making a level entry at the appropriate altitude gives you the best chance of seeing and being seen when you approach a busy airport.

Once in the pattern, landing gear and approach flaps are extended. The final landing check list is gone over. Power is cut back further and the aircraft is trimmed for an angle of descent resulting in the desired airspeed. A good rule-of-thumb is to use an airspeed 40 per cent above landing speed (or stall speed in landing configuration). Example: 40 per cent over a stall speed of 60k-84k.

In any event, the elevators—not the throttle—control the airspeed throughout the landing approach. The throttle controls the *rate of descent.* An aircraft that is sinking too fast needs *power,* not a yank on the yoke (elevators). The aircraft should be trimmed, at the onset of your approach, to an attitude which can be easily maintained with slight back pressure.

The downwind course is flown on as

nearly a parallel course as possible, for this is your first opportunity to feel out the wind and estimate how much you will have to correct for drift.

How far downwind you will fly before turning on base will depend on wind strength, pattern traffic and other considerations. If there is traffic ahead, you must extend your course as far as necessary to avoid cutting in. If you have an emergency, naturally you fly an abbreviated course.

Rounding the Square

In a high-wing aircraft your 90 degree turns on base, and again on final, should be at moderate bank, and as short as possible. It is important to keep the airfield constantly in view, and the high wing will block your view in a turn. In a low-wing aircraft you can round out the square, or fly a shallow circular base leg without losing sight of the runway.

Whether or not you have a radio clearance, before turning on final it is your responsibility to look and make certain no aircraft is in the pattern or making a long straight-in approach.

On final approach you should have at least 60 seconds to line yourself up with the runway, correct for drift, add flaps if you need them and observe conditions on the airfield. One mile from the threshold you should be well lined up and in good control of the aircraft. When you are certain you will not land short, you can reduce power further.

Most pilots prefer not to idle the engine on final approach. An idling engine cools very fast, and may not respond immediately to an emergency power need. You can usually wait until you are "over the fence" before you chop the power.

The Last Mile

Most of the serious accidents occur on final approach. Here is where the heaviest drain on the pilot's skill and alertness is made. Once lined up with the centerline, you must be quick to notice and correct for any deviation. You "crab" into the wind just enough to maintain a constant path over the ground.

In smooth air, over the runway threshold, airspeed may be reduced to 30 per cent over stall speed (80k when stall speed is 60k). This is effected by gentle back pressure on the elevators. At a point 10 to 15 feet above the runway, with the centerline directly below, additional back pressure is started to bring the nose up above the horizon. This is the landing stall, or "flare."

Flare is not a fully understood term. The word generally connotates an upward or outward movement. The aircraft is not intended to move upward at this point—although it will, if the back pressure is too quick or strong. In landings the flare refers to that phase of the stall preceding rapid descent.

When an aircraft stalls at altitude, it hesitates momentarily and then begins to drop off rapidly (about 3,000 feet per minute). When an aircraft is stalled a few feet above the ground, the flare, or hesitation in the nose-up position, allows it to settle to the ground gently before the rapid descent velocity can become established. But an aircraft which flares at 15 to 20 feet above the ground will hit the runway like a ton of bricks—unless there is *immediate* application of full power and a slackening of back pressure.

This is no time to be dainty, because time is critical here. The throttle is rammed wide open and held there until the aircraft is under control. If there is enough runway, you can still make your landing. But usually a go-around is the safest procedure.

Landing Accidents—1964

(Latest year for which complete statistics are available)

	Fatal	Non-Fatal	Total
Traffic pattern—VFR	10	46	56
Final approach—VFR	35	318	353
Final approach—IFR	8	8	16
Initial approach—IFR	2	1	3
Level off/touchdown	3	814	817
Landing roll	3	1,241	1,244
Go around—VFR	14	77	91
Missed approach—IFR	2	1	3
All other landing accidents	1	3	4
Totals	78	2,509	2,587

(Non-landing accidents totalled 2,483, with 426 fatals)

Left: locking on to the centerline at Washington National Airport. Above: starting to flare, Manassas (Va.) Center line-up protects pilot from runway edge obstacles. Below: touching down on main gear from full stall, Manassas.

"Floating" is a term applied to an aircraft which does not seem to want to touch down, but hangs in the air like a feather over the runway. An aircraft floats when its airspeed is too high and it has too much lift to stall. Careful, progressive reduction of airspeed as the flare begins will prevent floating.

As the aircraft settles, the nose-wheel is held off of the ground as long as possible. Tricycle landing gear is not, like tail-wheel gear, designed for three-point landing. Many a pilot-in-a-hurry has reported an "unexplicably" collapsed nose wheel gear.

With all three wheels on the ground and rolling, and plenty of runway ahead, probably every pilot experiences a warm inner relaxation. But his landing is not over yet. Gusty winds can still flip him over, or drag a wind down and spin him around in a ground loop. Regular practice in taxiing an aircraft under simulated wind conditions is good insurance.

Even in calm air, a moving aircraft, with a whirling propeller and gasoline in the tanks, is a potentially dangerous object—perhaps even more so on the ground than in the air. Erratic, or high speed taxiing can turn a happy landing into an expensive repair bill, when a wheel strays off the pavement and finds a chuck hole or a frost heave. No aircraft should be considered "landed safely" until it is hangered or tied down.

Along with practice and a thorough absorption of good landing habits goes an attitude of modest concern. The proper attitude was exemplified by a pilot who was instructed by the tower to "land with extreme caution" because of construction on the airport. He radioed back, "I always land with extreme caution."

A good motto for all airmen.

famous

FLIGHTS

Wilbur Wright, and passenger in flight near Pau, France, in 1908. Right, Wilbur with Mrs. H. O. Berg, his first woman passenger.

THE FIRST AMERICAN TO LAND IN FRANCE . . .

The time was 1908. The Wright brothers had made the first airplane fly nearly five years earlier. Still, only a handful of Americans knew anything about it. Fewer than a handful believed it. In the early summer of 1908, for example, Byron Newton, the top reporter of the famed *New York Herald,* sent a freelance story to a leading magazine describing some Wright brothers' flights he had witnessed a few weeks earlier. The editor returned the piece with the comment, "Your manuscript does not seem to qualify either as fact or fiction."

This incredulity was not limited to the layman. Scientific experts were equally skeptical when the U. S. Government advertised for bids to build an airplane, with specifications drawn precisely to fit the Wright aircraft. The January 1908 issue of the *American Magazine of Aeronautics* stated flatly, "There is no known flying machine in the world which could fulfill these specifications at the present moment. . . ."

There were many reasons why the amazing fact of man's first powered flight was ignored or disbelieved. The practical-minded American public was not attracted to the glamor of aviation. Public officials and newspaper editors had completely missed the economic —let alone the military—significance of powered, controlled flight. The Wright brothers—by nature, both reticent individuals—shied away from publicity. They also avoided publicity because of well-founded fears that their invention could be easily copied, their ideas put to use by others, and their potential wealth stolen. They sought continually to find buyers for their aircraft, but the fact was that, nearly five years after their first flight, they had not sold one airplane nor realized one cent of income from their invention. America's eyes were on the ground.

In Europe, however, the atmosphere was different. There was a keen interest in aviation, particularly in France. In the suburbs, outside of Paris, would-be pilots were daily trying out many types of proto-airplanes. Several had actually succeeded in flying. On October 15, 1907, a British sportsman living in France, Henry Farman, had established a new record by covering 918 feet in powered flight. Other fliers—Bleriot, Santos-Dumont and Delagrange—had also achieved successful, if brief, flights. Aviation was taking on the atmosphere of a contest and public interest in this competition was high. There was everywhere an expectation that aviation was ready to perform marvelous things.

And the Wright brother were ready to do them.

Back in Dayton, they were finishing the construction of six new and improved airplanes. Their hopes were high. They finally had two firm purchase offers. One was an American Government construction contract; the second came from a syndicate of French businessmen who wanted to manufacture Wright-designed planes in Europe. The flight demonstrations that would sew up both contracts were scheduled for the summer of 1908.

In the late spring, two of the Wright planes were dismantled and crated. Wilbur took one to France and Orville made preparations to go to Fort Myer, Va., across the Potomac from Washington, D. C.

Wilbur set up headquarters at a race track at Hunaudieres near LeMans, about 125 miles from Paris. The crowds began to gather and interest grew. The inventor-pilot, however, was in no hurry. Day after day he puttered about his flying machine, checking, testing, adjusting, scanning weather and terrain. Gradually, the French press and public grew skeptical. French newspapers began to allude to the Wright brothers as *"bluffeurs Americains,"* and intimated the whole venture was a hoax. Suddenly, on August 8—because the plane was ready and the winds were right—Wilbur, without any announcement, cranked up his engine and took off for a minute and half flight around the race track. Two days later, he performed two more brief flights.

The reaction to all flights was the same. The crowds gasped in disbelief and then broke into cheering and applause. "The newspapers and the French aviators nearly went wild with excitement. Bleriot and Delagrange were so excited they could hardly speak and Kapperer could only gasp, and could not talk at all. . . ." This was the usually laconic Wilbur writing to his brother.

Wilbur's triumph was complete. News of his flights were headlined on the front pages of all French papers. He was received as a hero. Souvenir post cards with his picture were printed; there were medals, testimonials and tributes. And the crowds that gathered at the airfield every day grew enormous. More significantly, these crowds included the most important men in Europe —ruling kings, statesmen and major industrialists—most of them anxious to learn how they could buy or make Wright brothers airplanes.

Back in the United States, the news of Wilbur's triumph still received only scant attention in the press. Some major papers did not even carry it while others ran only small stories on the inside pages.

But a few weeks later, Orville made headlines. In one record-breaking flight of more than an hour he circled the Fort Myer parade ground 55 times, demonstrating maneuvers that people had not even thought possible. It was a virtuoso performance, proving that he and his aircraft were in complete command of the air. The fame of the Wright brothers was instant and thorough.

After nearly five years of indifference, America became aware of the airplane and hailed as heroes the two great men who had invented it.—*Richard Shea.*

GOLD SEALS AWARDED WOMEN INSTRUCTORS

Bernice Steadman

Dorothy L. Young

The first FAA Gold Seal Certificates issued to women flight instructors have been awarded to Mrs. Catherine Hiller, Barre, Mass.; Mrs. Bernice Steadman, Flint, Mich. and Mrs. Dottie Young, Oklahoma City, Okla.

The Gold Seal Program was started in 1966 by FAA to identify flight instructors with superior records in training and proficiency, and to motivate others to improve their qualifications. There are about 35,000 active instructors in the U.S., including 475 women.

Mrs. Hiller, who has logged more than 12,000 hours of flight time, is owner of the Hiller Airport in Barre. She also serves as an FAA pilot examiner.

Mrs. Steadman, owner-operator of the Trimble Aviation Co. in Flint, achieved national fame last summer when she won the All-Woman Transcontinental Air Race, the "Powder Puff Derby."

Mrs. Young, chief pilot for helicopters for the Catlin Aviation Co. in Oklahoma City, was the first woman to be approved as an FAA examiner for helicopters.

All three women are charter members of the FAA's Women's Advisory Committee on Aviation.

The certificates are given to flight instructors who:

1) Hold commercial pilot certificate.

2) Hold a ground instructor certificate.

3) Have attended a flight instructor clinic since the flight instructor certificate was issued.

4) Have trained at least 10 successful applicants for certificates or ratings within 24 months.

Catherine Hiller

Aviation Courses Offered for Schoolroom Study

Aviation education is expected to get a marked assist from a program created by Cessna Aircraft Company to help introduce courses in aviation in the schools.

Recommended outlines for a course in aviation are available for elementary schools, high schools and junior colleges.

The course is designed to make young people more aware of the impact aviation has had upon social traditions, cultural structures and business practices, and to give them some insight into how rapid advances in aviation technology will affect the entire course of their lives.

"This is a major step in bringing aviation education to all levels of the public school systems and the junior colleges," says FAA deputy administrator for general aviation affairs Robert V. Reynolds about the Cessna program.

The aviation education course for elementary schools is tailored to fit into the science and social studies portion of the regular school curriculm. An elementary aviation unit kit for teachers, which includes a suggested course outline and numerous teaching aids, is available from Cessna for $3.50.

The high school package contains a list of suggested course materials detailin gthe importance of aviation in contemporary American life.

The junior college program gives details on more than 100 high school and junior college aviation courses now being offered in the United States.

Both the high school and junior college programs suggest that the classroom course be supplemented with some type of flight experience for students.

Students are invited to consider careers in any of the numerous aviation specialties, such as mechanical, engineering, piloting, air traffic control, flight instruction, aviation management and aviation sales.

Texas Still Leading State In Landing Facilities

Texas continues to lead the nation in aviation landing facilities, with 850 airports and 3 seaplanes bases, according to the latest FAA count. California is second with 648 airports and 11 seaplane bases.

The Federal Aviation Administration tallied 9,673 active airports and seaplane bases at the close of 1966, an increase of 82 over 1965. The increase represented the difference between 266 airports abandoned in 1966 and 373 reported to FAA for the first time.

The current total includes 8,891 airports, 418 heliports and 364 seaplane bases. Heliports located on airports are counted as separate facilities.

About two-thirds (6,043) of the total are privately owned. Lighted runways are provided at 2,988 airports and paved runways at 2,859. Thirty-six states have at least one airport with a runway 10,000 feet or longer.

Alaska has the most seaplane bases, 140. Maine is second, with 44.

10 Earn Salute From FAA Chief For Long-term Medical Service

Ten members of the first group of Aviation Medical Examiners, appointed in 1927, have been honored by FAA Administrator William F. McKee.

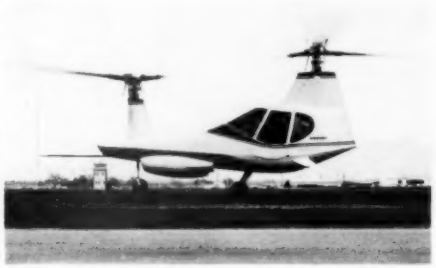
At the annual Civil Aviation Medicine Luncheon held in Washington last month, General McKee presented each of the men with FAA's Certificate of Commendation and expressed his gratitude for their 40 years of service.

The feted doctors were Thomas J. Cross, Forth Worth, Tex.; Albert F. Ebert, Chattanooga, Tenn.; William L. Hanson, Belleville, Ill.; Josiah B. Hibbits, Nashville, Tenn.; Vonnie M. Hicks, Raleigh, N.C.; William N. Hughes, Providence, R.I.; Whitman C. McConnell, St. Petersburg, Fla.; Edgar E. Poos, Detroit, Mich.; Phil E. Thomas, Jr., Little Rock, Ark.; and S. Wallace Todd, Albany, N.Y.

The ten physicians, all still in active practice, were part of a 144-member group of doctors designated by the Bureau of Air Commerce in 1927 to conduct physical examinations of applicants seeking pilots' licenses. Today there are nearly 6,000 Aviation Medical Examiners throughout the Free World, who perform an estimated 400,000 physical examinations a year.

Aviation Medical Examiners perform medical examinations of pilots at nominal fees, assist in the investigation of aircraft accidents, and help FAA officials in aviation education programs.

BRIEFS



• NO-HANDS HOVERABILITY is claimed for the Filper Beta 200, a two-place, 1,800-pound 'copter featuring tandem rigid rotors, said to provide greater control-ability. Company officials are seeking certification under fixed wing rules rather than helicopter rules because of unique design characteristics. The Beta 200 is expected to sell for about $28,000. In the design stage is a six-place, turbine powered craft which has a tentative sale price in the $60,000 range.

• APPLICATIONS FOR AID under the Federal-aid Airport Program (FAAP) arriving after the April 26 deadline will be considered on the basis of funds available at the time of submission. FAAP funds are provided to assist cities, counties, states and territories in developing their airport facilities to meet goals of the National Airport Plan. Grants are made on a cost-sharing basis with the Government providing generally 50 per cent of the cost of approved projects. Information about the program is available from area offices

• UP TO 50 AIRPLANES can be parked on a recently completed, 120,000 square foot hard-surfaced area for light aircraft at Dulles International Airport. Tiedown fees in the new area north of the hanger, running from $2.50 per day for single engine planes to $4 per day for light twins up to 12,500 pounds, are about half the parking fees charged on the heavy duty parking area east of the hangar. General aviation traffic at Dulles was almost 41 per cent higher in 1966 than in 1965.

• HOURS UP, ACCIDENT RATE DOWN for the second year in a row, according to preliminary data complied by the FAA. In 1966 an estimated 18,300,000 hours were flown by general aviation aircraft, compared with 16,733,000 hours in 1965. Flying accidents in 1966 totalled 5,518, or 30.2 accidents per 100,000 flight hours. In 1965 the rate was 31.5. The fatal accident rate in 1965 was 3.2; preliminary 1966 figures are 3.0 persons per 100,000 flight hours

• NAME CHANGED BUT THAT IS ALL. On April 1 the Federal Aviation Agency emerged as the Federal Aviation Administration when it became part of the Department of Transportation. There will be no change in the mission of the FAA.

• CONGRESS WILL BE LISTENING to aircraft noise with an attentive ear this session, FAA Administrator William F. McKee told a recent meeting of agency field directors in Washington. "People are going to demand that action be taken to solve the noise problem. If it isn't solved, the growth of air commerce in this country will be strangled," General McKee said.

FAA Rule Change Frees "Satellite" Airports

Pilots operating from small airports located within the control zones of larger airports will be permitted to use local visibility as the basis for operations, under a rule change announced by the Federal Aviation Administration.

Federal Aviation Regulations, Part 91, requiring that prevailing visibility at large airports also govern flight operations at all other so-called "satellite" airports within the control zone, were amended on April 16, 1967.

The new rule allows pilots using a satellite airport to operate according to his own observations of the local visibility conditions, as seen from the cockpit in ight or from the surace of the airport before take-off, when no accredited weather observer is stationed at that field.

In announcing the rule change, FAA pointed out that a primary airport in a control zone may have low visibility due to local fog, smoke or haze, while one or more of its satellite airports may have unlimited visibility.

FAA "Annual Report" Scheduled for June 13

A report on the Federal Aviation Administration's latest research and development efforts and a preview of new systems and equipment will be presented to the aviation community on Tuesday, June 13, 1967, when the agency holds its 1st "Annual Report to Industry" meeting in Washington, D. C.

Invitations are being sent to industry and pilot organizations to attend the meeting, to be held in the auditorium of FAA Headquarters Building, 800 Independence Avenue, S.S.

Key personnel from the agency's Research and Development Service, Aircraft Development Service, Installation and Materiel, Aviation Medicine and the National Airspace Program Offices will take part in a day-long program, beginning with registration at 8:30 a.m.

Among the topics to be discussed are the National Airspace System (NAS); noise research; V/STOL (vertical and short takeoff and landing) transportation; and medical research and safety programs.

Question and answer sessions will be held following each presentation. Adjournment is scheduled for 4:45 p.m.

• Helicopter Instrument Rating

I am a Naval aviator with an instrument rating earned in a helicopter flight check. My commercial certificate shows item VII as Rotorcraft-Helicopter, Sikorski S-61, Instruments. Does this constitute an FAA helicopter instrument rating? If not, how do I obtain this rating?

San Francisco

An instrument rating issued prior to Oct. 17, 1966, on the basis of IFR qualifications in a helicopter is valid for IFR operations in all categories of aircraft for which the holder is rated. When your pilot certificate is amended to show any new ratings you may acquire, ask your renewing inspector to amend your instrument rating to read "instruments, including helicopter." In the meantime, your present instrument rating is adequate.

• $ for Commercial Tickets

I am interested in becoming a commercial airline pilot. Although I have a private pilot's license, I have had difficulty in financing the training and number of flying hours I would need to obtain a commercial rating. Is there a source where people like me can borrow enough money to get this training?

Kingsport, Tenn.

The United States Office of Education is developing a program to make low-interest loans available for flight training through local financial institutions. It is their intention to make these loans available only to people who are seriously interested in obtaining a commercial license for vocational reasons, not for people interested in flying merely for recreation. As soon as the eligibility restrictions are formulated, the programs will go into effect. For more informations write to Dr. Walter Gale, Guarantee Agencies Section, Division of Student Financial Aid, Office of Education, Washington, D. C. 20202, or call 202-962-6804.

• No 'Area Ratings' Planned

Is it true that the FAA is considering establishing regulations requiring pilots to qualify for "area ratings" before being permitted to enter busy airport areas? We wish to register a violent protest against the idea.

Pompano Beach, Fla.

The Federal Aviation Administration has no plans at this time to require "area ratings" for general aviation pilots. To learn about advance notices of FAA proposed rule-making, consult the Federal Register, or apply to FAA (FS-43), Washington, D.C., 20553, for inclusion on the appropriate mailing list.

• Keeping Instructor Status

I have just been awarded commercial and instrument flight ratings and am presently working toward an instructor's rating. However, I have just been drafted and am concerned about maintaining my license and ratings while in the military service. Will I be subject to retesting upon completion of my military tour? Will flying helicopters qualify me to maintain these tickets provided I keep current with FAR requirements?

Miami

Current FAA Regulations provide that pilot certificates and ratings remain valid until surrendered, suspended or revoked. However, the holder of a pilot's certificate must meet the appropriate recent piloting experience requirement before carrying passengers in any type of aircraft. An expired flight instructor's certificate may be reinstated merely by passing the practical test required for its issuance. FAR 61, Certification of Pilots and Flight Instructors—Amendment 61-18, available free from the U. S. Government Printing Office, deals with "Biennial Recertification of Flight Instructors."

• Who Gives Pilot Training

Please send me a list of pilot and ground schools, indicating which ones provide the best training.

Beatrice, Neb.

We are sending you our list of FAA certificated flight and ground schools which meet minimum standards for certification. FAA does not rate the schools in any other way. Additional copies of this list (AC 140-2B) may be obtained directly from the FAA, FS-446, Washington, D. C. 20553.

• How to Buy ex-GI Plane

I am interested in purchasing a used military aircraft for my own private use. How might this be done?

Mt. Vernon, N.Y.

The Defense Logistics Service Center, Federal Building, Battle Creek, Mich. 49016, announces bids for surplus military aircraft. You may ask that office to contact you when one is available.

• Gelled Fuel Not Ready

I noted with interest the article "Thickened Fuel," in FAA AVIATION NEWS (February, 1967).

Can you advise me what company supplies or manufactures the chemical used, CHBA (N-Coco-Y-gydroxybutyramide) or where I can obtain such information?

A. V. Collins,
Mooney Chemicals, Inc.
Cleveland, Ohio

CHBA was developed by the Western Company, 2201 N. Waterview Parkway, Richardson, Texas 75080, under FAA contract.

CHBA gelled fuel represents the initial step in developing a fuel to be carried in aircraft tanks in a gelled condition. This differs from the concept of injecting a gelling agent into the fuel just prior to an emergency landing, which is not considered useful for commercial aircraft. CHBA offers good crash fire reduction characteristics, but fuel system incompatibility and other problems prevent its general use at this time.

FAA Aviation News welcomes comments from the aviation community. We will reserve this page for an exchange of views. No anonymous letters will be used, but names will be withheld on request.

• De-icing Dope Available

In the February 1967 issue of FAA AVIATION NEWS a brief article regarding the use of the "Snow Commander" for de-icing runways stirred my interest. I would appreciate any information your office may supply me concerning de-icing chemicals or preparations along with methods of application to runways or other large areas.

F. W. Miller, Lt. USNR
Field Maintenance Officer
U. S. Naval Air Station, San Francisco

The Snow Commander is built by Aero Commander Aircraft Corporation, 5001 Rockwell Avenue, Bethany, Oklahoma 73008. Brochures on its use will be sent you.

We are also sending SRDS Report No. 65-13, "Chemical Means for Prevention of Accumulation of Ice, Snow, and Slush on Runways," prepared for the agency by Monsanto Research Corporation. You may find it helpful.

• Terminal Study Plan

I am inquiring whether I might obtain a copy of the *Airport Terminal Plan Study* prepared for FAA by Porter and O'Brien (FAA/RDS-136), 1962. I looked in the monthly catalog of U. S. Government publications for that year, but did not see any mention of it.

I am conducting a study of the problems the large capacity jet transports will create at the airport. The study is concerned with changes in airport design that might be necessary to accommodate the greater amount of passenger traffic resulting from the use of these jets.

Philip C. Reese
Transportation Center,
Northwestern University

The "Airport Terminal Plan Study" is obtainable only from the Clearinghouse, U. S. Department of Commerce, Springfield Va. 22151, for $3.00. We are sending you a copy of FAA's Advisory Circular, "Preparation of Airport Layout Plans," which may also be helpful.

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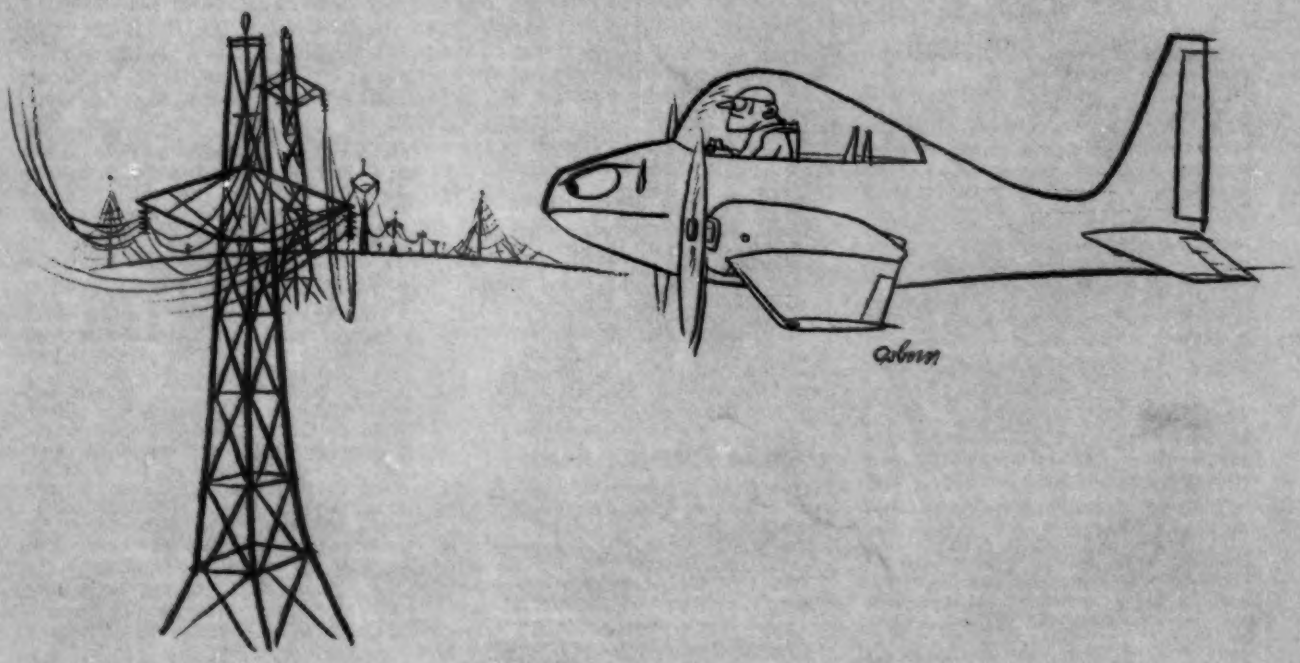
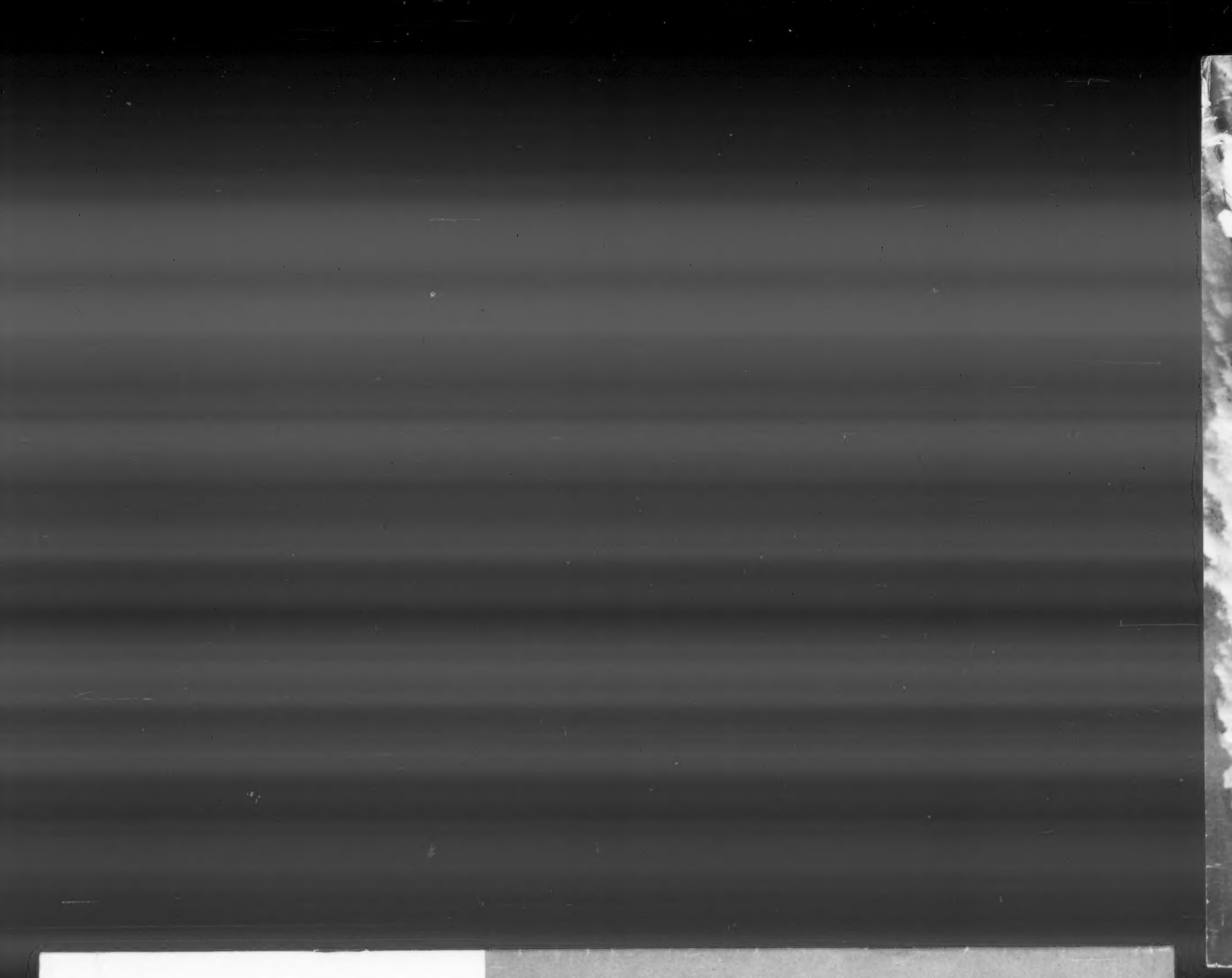
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